Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Location-Based Routing	)	PS Docket No. 18-64
For Wireless 911 Calls	)	

To: The Commission

REPLY COMMENTS OF
THE BOULDER REGIONAL EMERGENCY TELEPHONE SERVICE AUTHORITY

The Boulder Regional Emergency Telephone Service Authority ("BRETSA"),[1] by its attorney, hereby submits its Reply Comments on the Commission's March 22, 2018 Notice of Inquiry in the above-referenced matter.

I. Delays In Emergency Response Due To Phase I Misroutes Continue At Significant Levels.

West and the Texas 9-1-1 Entities have filed data confirming that Phase I Misroutes continue to pose a problem in terms of delay in delivery of wireless calls to the correct PSAP in many areas, delaying in dispatch of First Responders. This is consistent with BRETSA's experience. In BRETSA's experience, the number of Phase I Misroutes far exceeds the number of 9-1-1 calls in which callers are unable to identify their location *and* Phase II location information is not received before First Responders are dispatched.

CTIA acknowledges the misroute problem, and the importance of cooperation between wireless providers and PSAPs to remedy Phase I Misroutes. Indeed, it is the wireless provider which (i) is responsible for routing the wireless 9-1-1 call to the correct PSAP, and (ii) initiates site acquisition, design, construction, and modification. Only wireless providers can assure accurate 9-1-1 call routing is *considered* at each of these stages of site development.

[1] BRETSA is a Colorado 9-1-1 Authority which establishes, collects and distributes the Colorado Emergency Telephone Surcharge to fund 9-1-1 service in Boulder County, Colorado.

The Commission should adopt rules requiring wireless providers to identify the level of Phase I Misroutes occurring from *each* existing cell site/sector. Identifying the percentage of Phase I Misroutes will allow (i) development of means to display at the PSAP for each wireless 9-1-1 call the likelihood that the call has been misrouted, (ii) identification of cell sites and sectors for remediation of misroutes, and (iii) prioritization of cell sites and sectors for remediation of misroutes.[2]

Means of remediating Phase I Misroutes from existing sites would appear to include, *inter alia*, (i) reorientation of cell sectors, (ii) sectorization of an unsectorized cell site and orientation of the sectors to reduce service to more than one jurisdiction by a single system antenna, (iii) analysis of Phase I Misroutes to correct current default routing, (iv) possibly reducing the area served by a tower or sector if other sites in an adjacent jurisdiction are capable of handling traffic originating within that jurisdiction, and (v) reduction in the service area of the cell and deployment of additional sites. BRETSA would anticipate that sectorization of towers, and reduction in service areas coupled with deployment of additional sites, would be reserved to cases with substantial levels of misroutes and/or where wireless providers anticipated taking such actions in the near-term in any event to meet overall traffic requirements.

With respect to new sites and proposed modification of sites, Commission regulations should require wireless carriers to consider PSAP jurisdictional boundaries and the potential for Phase I Misroutes in site selection and design processes. In any case in which a site is selected and designed or modified so that a cell or sector can be anticipated to receive calls from two or more PSAP jurisdictions, the wireless provider should be required to contact the affected PSAPs

[2] BRETSA has previously reported that the Longmont, Colorado PSAP received wireless 9-1-1 calls concerning accidents on Interstate 25, which lies a significant distance beyond the Longmont City limits and Boulder County Line. BRETSA surmised that when cell towers nearer I-25 were at capacity, additional calls placed by motorists might "leapfrog" those towers and be connected through antennas in Longmont. If this does in fact occur, then any cell site or sector may be susceptible to 9-1-1 misroutes under heavy call-traffic conditions.

to agree upon (i) initial default routing of 9-1-1 calls, (ii) a schedule to review 9-1-1 traffic and default routing based upon 9-1-1 traffic studies, and (iii) provide contact information for the PSAPs to initiate review any time they believe a majority of 9-1-1 calls are being misrouted.

II. Methods Of Remediating Phase I Misroutes Or Their Effects.

In addition to the methods described above for remediating Phase I Misroutes, which involve cell/sector architecture, (i) 9-1-1 calls through sites with high levels of misroutes could be held until Phase II location date is available, (ii) location-based routing of all calls could be implemented, and (iii) "Phase III" Routing could be implemented.

A. Hold 9-1-1 Calls Until Caller Location Is Identified.

CSRIC V recommended *against*, holding wireless 9-1-1 calls until the caller's location is identified, because it could delay routing of the call and result in callers hanging up and re-dialing 9-1-1. However the holding of calls until a Phase II location is received should remain an option provided (i) the calls received through cell sites and sectors which have high percentages of Misroutes, (ii) if a Phase II location is not received within a given period, the call would be Phase I-routed, (iii) while the call is being held the user would be provided a ringing sound or recorded verbal instruction such as: "Please wait while we determine your location; if you hang up delivery of your 9-1-1 call will be delayed," and (iv) each PSAP affected would have input on the Misroute solution to be implemented, including holding the call for Phase II location data.

B. Implement Location-Based Routing.

BRETSA understands "location-based routing" to refer to the routing of 9-1-1 calls based on highly accurate or precise location information, which would be available as quickly as Phase I routing information. Such a solution has not been demonstrated to exist today.[3]

[3] NextNav has stated that its solution would provide 50-meter location accuracy within 6 seconds from a cold start. NextNav states herein that it can provide a highly accurate caller location within two-to-five seconds. NextNav

As location-based apps are increasingly used on wireless phones, and battery technology improves, users are increasingly likely to leave their devices' location services enabled so that GPS and other location information would be available when "9-1-1" was dialed. Even so, GPS is not reliably available in indoor and urban locations.

C. Implement Phase III Routing.

BRETSA has used the term "Phase III Routing" to refer to routing of wireless calls based on information which is more precise than Phase I location information, yet not as accurate as Phase II location information. Any increased accuracy over Phase I information would reduce the number of misrouted 9-1-1 calls, even if not sufficiently accurate for Emergency Response.

D. Phase I Routing Must Continue To Be Available

No location technology will be available and reliable in all situations. Even after implementation of Location Based Routing or Phase III Routing, 9-1-1 calls should be routed on Phase I data if device location information is not received within an established time limit.

III. Practical Considerations In 9-1-1 Call Routing.

Development and selection of solutions for wireless 9-1-1 call routing should proceed in the context of the practical and operational use of the information by PSAPs. BRETSA again emphasizes key facts critical to improving the effectiveness of Emergency Response to wireless 9-1-1 calls:

1. It is most critical that 9-1-1 calls are routed to the correct PSAP. Misrouted calls can be transferred, and some delay mitigated; but the call cannot be processed and First Responders dispatched until the call reaches the correct PSAP.

Comments, at 4. However these claims have not been independently verified because CSRIC III did not test for time-to-first-fix (an accurate first fix), but rather the degree of accuracy which could be achieved within 30-seconds.

2. In the vast majority of cases, Phase II information is received or the caller is able to verbally provide or describe their location to the PSAP before First Responders would be dispatched. PSAP personnel will interview the caller for the nature and location of the information, ask questions to confirm the nature and location of the information and to obtain a more accurate description of the incident than an excited caller may initially provide, and determine what complement of First Responders to dispatch. During this time, and indeed while First Responders are in transit to the caller's location, additional or more accurate information which may be received as to the caller's location will be useful and used.

3. Far more wireless callers to 9-1-1 are impacted by misrouting of their call than by an inability of the PSAP to determine the caller's location, either from ALI data or the caller telling the PSAP their location.

4. The determination of the caller's location (the "door to kick in," as some commenters put it) based upon proximity to a WiFi or Bluetooth transmitter would be reckless. The precise location of a WiFi or Bluetooth transmitter within a building would not be known, nor even the building or unit in which the transmitter is located, as BRETSA understands it. The signal strength from such transmitters may be stronger in adjacent units or an exterior area than in parts of the structure or unit in which the transmitter is located. First Responders and civilians have been injured and killed as a result of First Responders conducting raids on or responding to incorrect addresses, including as a result of "Swatting." Dispatchable addresses appear little more than estimates of the civil address and unit in which a caller is located, and likely to produce similar results.

5. Caller locations[4] should be provided PSAPs *other* than through reference to civil addresses which are in proximity to the caller. PSAPs and First Responders must understand the range of possible locations of the caller and level of uncertainty. PSAPs have incident and premises records, and dispatchers have "local knowledge" of locations and callers regularly involved in incidents, which may allow PSAPs to make more educated estimates of caller/incident locations when Phase II data is unavailable and callers cannot verbally provide their location.

6. It has been suggested that the solution for Phase I Misroutes is to consolidate PSAPs.[5] This would be the tail wagging the dog and could compromise effectiveness of overall Emergency Response. PSAP personnel have to be familiar not only with the operation and use of multiple PSAP systems, they must know the business rules of the PSAP and of the agencies they dispatch for handling of calls and the complement of First Responder units to be dispatched to different types of events. They must be familiar with the state and local codes, as well as agency business rules, to know which calls require dispatch of First Responders on an emergency or non-emergency basis, which require dispatch of civilian employees or volunteers on a non-emergency basis, which require the caller to go to a police substation, other physical location or website to file a report, and which require no action at all. Efficient and effective processing of 9-1-1 calls is enhanced by familiarity with the area concerned, the locations, buildings, businesses, etc., including locations at which traffic accidents and other

[4] The caller location is not always the same as the incident location.
[5] Many also continue to argue that the remedy for Misroutes is for PSAPs to transition to NG9-1-1. See Verizon Comments, at 3. This is not a solution. As stated by West, NG9-1-1 *uses* location data, it does not *provide* caller location data. West Comments, at 17.

incidents are likely to occur, people regularly calling 9-1-1 or involved in certain types of incidents, and the First Responders they dispatch. There is a limit to the number of sets of codes and business rules and response areas with which a dispatcher can maintain a working familiarity. 9-1-1 calls can be processed and First Responders dispatched much more quickly where the dispatcher has a working familiarity with such information than where they must "look up the information." PSAPs must also have the radio systems and channels to dispatch First Responders.

For example, the Boulder County Sheriff's PSAP dispatches the Sheriff's Department, 5 police departments of smaller cities and towns in Boulder County, and 23 rural fire districts. The area dispatched by the Sheriff's PSAP ranges from agricultural areas on the plains east of the Colorado mountains, through the "foothills" and to the Continental Divide which forms the western boundary of Boulder County. It includes urban, suburban, and rural areas, National Forests, popular hiking, kayaking, mountain climbing, cross-country and downhill skiing areas, snow-shoeing, snowmobiling, mountain biking, backpacking, hunting and fishing areas. Sheriff's deputies and other First Responders the PSAP dispatches patrol and respond to major urban highways, US and State Highways, secondary roads, unimproved and dirt county roads, four-wheel roads, single tracks and roadless wilderness areas. This is a challenge for dispatchers. PSAPs in other areas of the state and the country respond to other types and different mixes of areas, different types of recreational, agricultural and industrial use which result in different types of calls. While dispatchers with the Boulder Sheriff's PSAP are

able to manage the dispatch of the current number of agencies in response to the variety of types of calls and incidents from across its jurisdiction; it is clear to BRETSA that there is a limit to the number of agencies and jurisdictions a PSAP can effectively, efficiently and expeditiously process and dispatch.

7. Modern telecommunications and information processing information empowers local management of incidents and Emergency Response where dispatchers and decisionmakers are closer to the site of the incident, have greater knowledge about the incident, its location and collateral considerations in responding to them, and can best manage the response. Modern telecommunications and information processing can also enable greater centralization of control of dispatch and decisionmaking with respect to emergencies. BRETSA respectfully submits that local decisionmaking, based on superior knowledge of the local environment and conditions, and better knowledge of and closer contact with First Responders, has proven most efficient and effective.

8. Finally, there is the issue of local government agencies having authority within their jurisdictions, and benefitting from governmental immunity when acting within their authority within their jurisdictions. This is addressed by interagency agreements where dispatch of multiple jurisdictions is consolidated; but there would seem to be a limit in the extent to which PSAPs could be consolidated and each jurisdiction involved would reasonably maintain oversight and control of services to its constituents within its jurisdictional borders.

IV. Providing GPS To Indoor Locations.

BRETSA understands that NextNav is deploying systems which provide terrestrial GPS beacons operating on frequencies near enough to the GPS frequencies that limited modifications

to the user devices would be required to use the NextNav system. NextNav's system also provides barometric pressure Z-axis location information, can provide a GPS fix from a cold start within 6 seconds, and performed quite well in the CSRIC III tests. NextNav states in its comments herein that it can now produce a highly accurate location within two-to-five seconds.

However BRETSA also understands that wireless providers object to *de jure* or *de facto* adoption of a location technology which would effectively grant a single party a monopoly over 9-1-1 location information. BRETSA finds it inconceivable that the wireless industry and NextNav could not develop a pricing methodology which would allow NextNav to monetize its service without permitting monopoly pricing, and require NextNav to serve all jurisdictions requiring its service for reliable and accurate 9-1-1 call routing and caller location. If FCC licensing creates a monopoly service provider, the FCC is obligated to prevent monopoly pricing, for example through cost-based rate-of-return regulation.

BRETSA proposed in its Comments herein an alternative solution to a monopoly terrestrial GPS system. BRETSA's proposed the Commission adopt equipment requirements that broadcast, WiFi APs and Bluetooth beacons include the capability to determine and retransmit their geographic coordinates with a time synchronization signal, to permit other WiFi APs and Bluetooth beacons and user devices to determine and relay their geographic coordinates

Implementation of a terrestrial system of (i) broadcast stations transmitting GPS signals capable of penetrating buildings, and (ii) a mesh of low power WiFi and Bluetooth transmitters providing GPS data, would in the long term provide a non-proprietary indoor location solution. Rather than user devices merely identifying proximity to WiFi and Bluetooth transmitters of uncertain location; this solution, like NextNav's would allow user devices to determine their accurate location based upon their distance from the known coordinates of such transmitters,

without creating a *de jure* or *de facto* monopoly. Inefficient, increasing the cost of broadcast, WiFi and Bluetooth transmitters for all, but less expensive for service providers.

BRETSA does not believe any of the methods of remediating Phase I Misroutes discussed to this point require deployment of NG9-1-1 for implementation.

V. VoIP 9-1-1 Call Routing and Location Data.

If a GPS-type solution such as a broadcast/WiFi/Bluetooth transmitter-based system or a NextNav-type system is implemented, GPS chipsets can be incorporated in VoIP devices and handsets to enable them to include an accurate location object in the VoIP data-stream. VoIP implemented over CMRS user devices should default to use the CMRS devices' and service providers' native calling functionality for 9-1-1 calls. Where VoIP is implemented on PCs or other devices unlikely to include such chipsets, user registration of their location will continue to be required. If there is a means to enable the VoIP App to identify conditions indicating that a device has been relocated or connected through a different Internet access point, such as proximity to a device in the NEAD, the App can prompt the user to update the registered location and perhaps notify the VoIP provider that the registered location may be outdated.

Respectfully submitted,

BOULDER REGIONAL EMERGENCY TELEPHONE SERVICE AUTHORITY

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